

*Frosts* were of almost daily occurrence in the Rocky Mountain and Plateau districts (except southern Arizona,) the Northwest and in the Lake region from November 2nd, and in the Atlantic and interior of the Gulf States, the Ohio valley and Tennessee from the 15th and 16th. On the Pacific coast they were frequent in the interior from the 19th. From the 16th killing frosts were frequent and general in the South Atlantic and Gulf States, extending to the entire coasts of Texas, Louisiana, Mississippi, Alabama and northern Florida. In California, frosts occurred at Yuma, Sacramento and Visalia on the 18th.

*Ice*.—The dates on which ice formed in the various districts are indicated in the preceding paragraph, where the days on which freezing temperatures occurred are given.

## PRECIPITATION.

The general distribution of rain-fall (including melted snow,) for November 1880, is shown on Chart No. III, as accurately as possible from about 500 reports. The table on this chart shows for the various districts the *average* precipitation for November, as compared with that of the present month. The belt of greatest rain-fall extended from the Mountain region of North Carolina, southward to eastern Texas. Southern Arizona is the only section of country over which no rain has fallen during the month. The rain-fall in New England and the Middle Atlantic States continues deficient. In the first district the deficiencies since January 1, 1880 amount to 6.51 inches, in the latter to 4.60. A marked excess has been reported from Tennessee, the South Atlantic and Gulf States, amounting in the Western Gulf district to 3.38 inches, the greatest excess of the month. The departures from the average precipitation at certain stations in the last named district were as follows: Corsicana, 2.05 above; Shreveport, 2.89 above; Galveston, 3.30 above and Vicksburg, 9.52 above; the rain-fall at the last station was over three times the normal amount. On the Pacific coast the rain-fall has been generally deficient, being only about one-third of the average. In districts not named the deviations from the normal rain-fall have been less important.

*Special Heavy Rains*.—4th, Vicksburg, 1.15 inches in 3 hours and 25 minutes. 5th, Fredericksburg, Tex., 2.13 in. in less than 8 hours; Galveston, 2.04 in. 5th and 6th, Quitman, Ga., 4.70 in.; Emmitsburg, Md., 2.60 in.; Point Pleasant, La., 3.31 in. 6th, Cincinnati, 1.50 in.; Little Mountain, O., 1.50 in. in 15 hours; 7th, Niles, Mich., 1.40 in. in 7 hours. 9th, Memphis, 1.70 in. in 5 hours; Pt. Pleasant, La., 3.48 in.; Dodge City, 1.05 in. in 6 hours; Shreveport, 2.20 in. in 4 hours. 10th, Atlanta, 2.19 in.; Cedar Keys, Fla., 1.43 in. in 5 hours and 13 minutes; Pensacola, 1.23 in. in 3 hrs., 30 min. 13th, Galveston, 2.25 in., of which 1.91 fell in 8 hrs.; Indianola, 1.13 in. in 8 hrs.; Brownsville, Tex., 2.00 in. in less than 8 hrs.; Pensacola, 2.03 in. in 5 hrs. 20 min. 14th and 15th, Kittyhawk, 3.64 in., of which 2.15 in. fell in 16 hrs. 17th and 18th, Pt. Pleasant, La., 2.01 in. 20th, Block Island, 1.64 in. in 9 hrs. 30 min. 21st, Cedar Keys, Fla., 1.96 in. in 6 hrs. and 30 min. 24th and 25th, Pt. Pleasant, La., 3.01 in.; White Plains, N. Y., 2.20 in.; Vicksburg, 3.22 in., of which 2.97 fell in 16 hrs. 26th and 27th, Green Springs, Ala., 4.73 in. 27th and 28th, Gainesville, Ga., 4.00 in.; Pt. Pleasant, La., 4.07 in.; Vicksburg, 4.03 in., of which 2.89 fell in 16 hrs.; Fayette, Miss., 5.60 in. 28th, Chattanooga, 1.98 in. 28th and 29th, Highlands, N. C., 2.90 in.; Franklin, N. C., 4.40 in. 29th and 30th, Green Springs, Ala., 3.50 in.; Pt. Pleasant, La., 2.61 in. 30th, Chattanooga, 1.93 in. in 8 hrs; Vicksburg, 2.81 in., of which 1.77 fell in 8 hrs.

*The Largest Monthly Rain-falls during November 1880*, are as follows:—Point Pleasant, La., 19.52 inches. Vicksburg, Miss., 14.15. Cape Hatteras, N. C., 12.86. Ellsworth, N. C., 13.50. Fayette, Miss., 10.60. Green Springs, Ala., 10.54. Kittyhawk, N. C., 9.92. Mt. Washington, N. H., 9.37. Quitman, Ga., 8.90. Galveston, Tex., 8.85. Chattanooga, Tenn., 8.82. Highlands, N. C., 8.73. New Ulm, Tex., 8.62. Gainesville, Ga., 8.40. Memphis, 8.39. Atlanta, Ga., 8.21. Cape Henry, Va., 8.11.

*The Smallest Monthly Rain-falls* are:—Arizona, (except 0.13 inch at Forts Apache and Verde,) none. Ft. Yuma, Cal., Silver City, N. M. and Ft. Pembina, Dak., none. Ft. Hall, Idaho, Battle Mountain, Nev., El Paso, Tex. and Suisan, Cal., 0.02. Olivet, D. T., 0.03. Morriston, D. T., Dunigan, Delano, and Sacramento, Cal. and Kelton, Utah, 0.05. Petaluma, Cal. and St. Vincent, 0.07. Ravenna, Cal., and Hermosa, Cal., 0.09. Ft. Elliott, Tex., Ft. Wallace, Kan., Reno, Beowawe and Golconda, Nev., Blue Creek, Utah, and Tehama, Willows and Tehachapi, Cal., 0.10. Nora Springs, Iowa, 0.12. La Mesilla, N. M., Reading, Cal., 0.13. Red Bluff and South Vallejo, Cal., 0.14.

*Rainy Days*.—The number of days on which rain or snow has fallen, varies as follows: New England, 9 to 21. Middle Atlantic States, 7 to 18. South Atlantic States, 13 to 21. Eastern Gulf States, 7 to 18. Western Gulf States, 11 to 22. Ohio valley and Tennessee, 13 to 17. Lower Lake region, 17 to 24. Upper Lake region, 12 to 18. Upper Mississippi valley, 9 to 14. Lower Missouri valley, 6 to 15. Valley of the Red River of the North, 9 to 14. Texas, 2 to 17. Rocky Mountains, 0 to 14. Middle Plateau, 1 to 13. California, 1 to 3. Oregon, 4 to 11.

*Cloudy Days*.—The number varies in New England from 3 to 18. Middle Atlantic States, 5 to 15. South Atlantic States, 14 to 20. Eastern Gulf States, 2 to 18. Western Gulf States, 13 to 19. Ohio valley and Tennessee, 10 to 17. Lower Lake region, 13 to 20. Upper Lake region, 10 to 19. Upper Mississippi valley, 9 to 14. Missouri valley, 9 to 12. Valley of the Red River of the North, 6 to 9. Texas, 10 to 19. Rocky Mountains, 3 to 9. Middle Plateau, 3 to 9. California, 1 to 4. Oregon, 9 to 12.

*Droughts.*—Wellington, Kan., 30th, streams and springs drying up. Mendon, Mass., 30th, many wells dry. Westborough, Mass., 30th, brooks, springs and wells very low. Antrim, N. H., streams unusually low.

*Snow from Cloudless Sky.*—Lawrence, Kan., 27th. New Ulm, Minn., 28th. Santa Fe, 5th.

### RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, 63 to 75. Middle Atlantic States, 66 to 90. South Atlantic States, 65 to 83. Eastern Gulf States, 69 to 83. Western Gulf States, 64 to 82. Ohio valley and Tennessee, 64 to 80. Lower Lake region, 69 to 75. Upper Lake region, 66 to 86. Upper Mississippi valley, 63 to 71. Lower Missouri valley, 60 to 79. Red River of the North Valley, 78 to 85. Texas, 66 to 82. Middle Plateau, 36 to 59. California, 43 to 59. Oregon, 74 to 83. *High stations* report the following percentages not corrected for altitude: Mt. Washington, 88.6; Pike's Peak, 60.6; Santa Fe, 55.2; Cheyenne, 56.1; Denver, 64.3.

### WINDS.

The prevailing winds at Signal Service stations are shown on chart No. II, by arrows which fly with the wind. *Westerly* winds have prevailed in the Lake region and New England; *northwesterly* winds in the Middle States; *northeasterly* in the South Atlantic and East Gulf States; elsewhere east of the Rocky Mountains they have been *northerly*, except in the Upper Mississippi valley, where they were from *northwest to southwest*.

*High Winds.*—On Mount Washington a velocity of 105 miles, NW., occurred on the 21st, and 102, NW., on the 7th and 12th. Maximum velocities ranging from 52 to 96 miles, occurred on eighteen other days; these high winds were from the northwest on all but five days, four from the south and one from the southwest. Maximum velocities exceeding fifty miles or more occurred elsewhere as follows: Kittyhawk, N. 50, on the 23rd; Cape Lookout, E. 50, on the 4th; Buffalo, SW. 52 on the 7th; Cape May, NW. 60 on the 21st; Pike's Peak, W. 70, on the 20th.

The following are the largest total movements in the various districts: Pike's Peak, 15,645. Cape Lookout, 12,763. Wood's Holl, 12,316. Indianola, 12,109. Cape May, 11,667. New Shoreham, 11,602. Mount Washington, 10,087, incomplete on account of frost-work. Sandusky, 8,976. North Platte, 8,827. Alpena, 8,202. Breckenridge, 8,112. Bismarck, 8,085. Winnemucca, 6,040. The *smallest* are: Roseburg, 1,135. La Mesilla, 1,208. Visalia, 1,580. Lynchburg, 1,722. Augusta, 2,066. Salt Lake City, 2,090. Uvalde, 2,620. Helena, 2,838. Nashville, 2,893. Leavenworth, 3,031. Springfield, Mass., 3,068.

*Local storms*, worthy of record, have been noted in connection with the various high and low areas, except as follows: A violent tornado at Keachi, De Soto parish, La., at 4:30 p. m., November 9th. Its course was from north to south, in a path about two hundred and fifty yards wide; length from eight to ten miles. On Moore's plantation, four miles distant, a gin house was blown down, killing one man and four mules. The chapel and other buildings, connected with the Baptist Female college, at Keachi, were unroofed or badly damaged; seven other buildings were torn to pieces or much damaged. In Keachi, one person was killed and nine were injured, three seriously. Serious damage was done at other places in the parish to buildings and other property. On the 13th a violent wind storm occurred in Santa Ana valley, Cal., prostrating all the wind mills and telegraph wires and delaying trains, several of which were ditched.

*Whirlwind.*—Yuma, Cal., 21st, traveling from southwest to northeast; cloud funnel-shaped, upper end lagged behind so as to incline the column about 70° from the perpendicular; cloud about ten feet in diameter and appeared to revolve from left to right.

*Sand-Storms.*—Visalia, Cal., 17th, 18th, very severe on the 19th, killing large numbers of sheep. Umatilla, Or., 7th, very severe. Near Mammoth Tank, Cal., 16th, worst ever known; stopped railway traffic for sixteen hours.

### VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily indications for November, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.2 per cent. The percentages for the four elements are: Weather, 89.6; Direction of the Wind, 82.6; Temperature, 87.2; Barometer, 81.0 per cent. By geographical districts they are: for New England, 82.7; Middle States, 80.4; South Atlantic States, 84.4; Eastern Gulf States, 86.6; Western Gulf States, 89.8; Lower Lake region, 86.2; Upper Lake region, 87.5; Tennessee and the Ohio valley, 86.6; Upper Mississippi valley, 84.2; Lower Missouri valley, 83.3; Northern Pacific coast region, 78.4; Central Pacific coast region, 88.0; Southern Pacific coast region, 91.7. There were 32 omissions to predict out of 3,690 or 0.87 per cent. Of the 3,658 predictions that have been made, 166, or 4.54 per cent. are considered to have entirely failed; 101, or 2.76 per cent. were one-fourth verified; 378, or 10.33 per cent. were one-half verified; 442, or 12.08 per cent. were three-fourths verified; 2,571, or 70.29 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

*Cautionary Signals.*—218 Cautionary Signals were displayed during the month, of which 190, or 87.2 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of, the station. 68 Off-shore Signals were displayed, of which 60 or 91.2 per cent, were fully justified, and 64 or 94.1 per cent, justified as to direction. Forty-five of the Off-Shore were changed from Cautionary.